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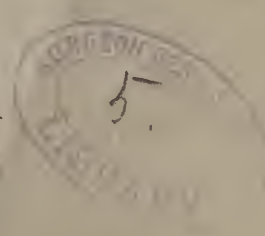
THE PRINCIPLES AND PRACTICE OF SURGERY,

DELIVERED IN THE

JEFFERSON MEDICAL COLLEGE, PHILADELPHIA,

BY THOMAS D. MÜTTER, M. D.

PART I.



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## PURULENT DEPOSITE, ETC.

*Definition.*—An abscess which differs from the ordinary forms in the circumstances of its pus not being originally formed in the parts in which it is found. It is hence sometimes called *symptomatic abscess*. Cite examples. Why called abscess by congestion?

*Parts most liable to this form of abscess.*

*Pathology.*

*Character of the pus.*

*Diagnosis.*—Often obscure.

*Prognosis.*—Usually unfavorable.

*Treatment.*—Depends somewhat on circumstances. Governed by general principles. To illustrate more clearly the proper treatment speak of that form called *Psoas abscess*.

## METASTATIC ABSCESS.

*Definition.*—An abscess that suddenly forms without any previous indication of inflammatory action, and in parts distant from the point in which suppuration has originally existed. Hence it was supposed by some that the pus actually changed its location, or that *metastasis* took place.

*Location.*—Usually in the viscera. Sometimes they are met with in the cellular tissue, muscles, joints, &c. They generally select the largest viscera and those most highly organized.

*Number.*—Varies from one to several.

*Exciting causes.*—Wounds, great surgical operations, injuries of the head, trivial wounds, in bad constitutions, delivery.

*Proximate cause.*—A number of theories on this point; supposed by some to be tubercles previously existing in the organs attacked, and softened by the general irritation of the system; by others, direct absorption of pus by the veins or lymphatics, is considered the true cause; others again refer it to *sympathy*; but the doctrine now generally received, is that which considers the true cause to reside in *inflammation of the venous capillary vessels or larger veins*.

*Condition of the organ in which or around which the abscess forms.*

*Symptoms.*—1. Constitutional. 2. Local. Both modified by the location of the abscess.

*Diagnosis.*—Obscure.

*Prognosis.*—Generally unfavorable.

*Treatment.*—1. General remedies. 2. Local remedies. Both modified by circumstances.

## FISTULA, OR SINUS.

*Definition.*

*Causes.*

*Symptoms.*

*Pathology.*

*Diagnosis.*

*Prognosis.*

*Treatment.*

## HECTIC FEVER.

*Definition.*

*Causes.*—1. Constitutional. 2. Local.

*Symptoms.*—May be divided into *three* groups: 1. Slight febrile action, with exacerbations in the evening. 2. The febrile action is continued. 3. Prostration indicated by perspiration, diarrhœa, marasmus, &c.

*Diagnosis.*

*Prognosis.*

*Treatment.*

## X. ULCERATION.

*Definition.*—Differently defined by different authors. I adopt that of Phillips: "Ulceration is that product of inflammation in which there is a loss of some part of the body, which from some peculiarity, *local*, or *general of the constitution*, manifests no tendency to heal, so long as that particular condition exists."

*Distinction between wounds and ulcers.*

*Predisposing or exciting causes of ulceration.*—1. Constitutional. 2. Local. *Proximate cause.*—Difference of opinion among authors. Hunter's doctrine of "Ulcerative absorption" explained. Difference between it and "progressive absorption."

*Liability of tissues to ulceration.*—The most highly organized, are most frequently attacked. Some tissues are exempt.

*Natural tendency of ulceration.*—When left to itself it generally extends. Sometimes it heals *spontaneously*.

*Effects of ulceration upon the part attacked, or upon the constitution.*

*Tissue forming the surface of an ulcer.*—Called a *granulating surface*.

### GRANULATION.

*Nature of granulations.*—1, basis or element of which they are formed; 2, size; 3, color; 4, shape; 5, temperature; 6, organization. Gueterboch's statement as to what enters into the composition of a granulating surface.

*Dependence of granulation upon suppuration.*—Pus is supposed by some to be essential to the formation of granulations; by others this is doubted. It is not found, for example, in ulcers of the cornea or cartilage.

### CICATRIZATION.

*Cicatrization, or the healing of granulating surfaces.*

*Definition of a cicatrix.*—Tissue by which a wound or ulcer is united. By Delpech it is called the "*inodular tissue*."

*Difference between cicatrix and the tissue it unites.*

*Modification.*—This process is modified by a variety of circumstances; for example—

1. When it occurs under a scab or crust of blood, the cicatrix forms over the whole surface, and is smooth and pliant.

2. When it takes place on a smooth, moist surface, as when a wound heals by the "modelling process of M'Cartney," the surface is smooth, and the cicatrix a mere line.

3. When it forms on granulations, the process usually commences at the edges of the ulcer, and the surface is often irregular and prominent.

4. It is also much modified by the *cause* of ulceration. Those, for example, produced by burns or scalds, are more irregular, have more extensive adhesions, and cause more serious deformity, than when they result from any other cause. *Specific ulcers* usually produce a characteristic cicatrix.

5. The character of a cicatrix is also modified by the *tissue* in which it occurs.

*Structure of cicatrix.*

*Profundity or depth.*

*Force with which it contracts during the process of formation.*

*Circumstances which prevent or retard cicatrization.*

*Nature of the tissue of the cicatrix.*

*Power of resisting diseases and disease peculiar to the cicatrix.*—Refer to Sir C. Hawkins for an excellent paper on *Cancer of cicatrices*.

*Form of cicatrix. Dupuytren's classification.*

*Prognosis as to the result of operations.*—Depends on a variety of circumstances. We must take into consideration—1st, the depth of the cicatrix; 2d, its age; 3d, its location; 4th, its extent; 5th, its peculiar character; 6th, its vascularity; 7th, the condition of the parts in its vicinity; 8th, the health of the patient.

*Treatment of cicatrices.*—May be divided into—1. That proper during the formation of the cicatrix. 2d. That required after its complete formation.

*Indications under first head.*—1. Remove all agents calculated to prevent cicatrization.

2. Endeavour, as a general rule, to make the cicatrix as small as possible, unless by so doing we interfere with some function.

3. Prevent the cicatrix being too small or too short, as in wounds about the fingers, face, &c.

4. By caustics or the knife prevent fungous granulations.

*Indications under the second head.*—1. Endeavour to relax the cicatrix by frictions, baths, extension, &c.

2. When these means fail, perform an operation. The character of the operation is modified by circumstances. To render this part of the subject more simple, the operation required in each form of cicatrix may be briefly referred to.

(1.) In the *narrow cicatrix*, without extensive adhesions, divide the cicatrix, extend it and maintain it extended for some time.

(2.) In the *prominent cicatrix*, *slice* it off, or keep it down with caustics, or slough it out.

(3.) In the cicatrix with *extensive adhesions*, cut out the cicatrix and fill up the space with sound skin. The practice of Hildanus, Earle, &c., in these cases explained.

(4.) In contraction of *natural openings*. The operation of Dieffenbach, &c., explained.

(5.) When an organ is *entirely destroyed*, the *cicatrix* must be removed, and a plastic operation performed.

#### ULCERS.

*Definition.*—Solution of continuity accompanied by the secretion of pus or other fluid—(Liston and S. Cooper.) A granulating surface secreting pus—(A. Cooper.) This definition is objectionable, inasmuch as we may have secretion of pus *without granulations*. The definition of Liston and S. Cooper is better.

*Difference between ulceration and an ulcer.*

*Classification.*—Difficult. The causes, the symptoms, and the parts attacked, have each been taken as the basis of a classification. That of Liston I prefer as being most simple. He makes six varieties of ulcer, and in this agrees with Sir E. Home. Their classifications are almost identical.

1. The simple, healthy, or healing ulcer.

2. The weak or sluggish ulcer.

3. The indolent ulcer.

4. The irritable ulcer.

5. The specific ulcer.

6. The varicose ulcer.

## SIMPLE ULCER.

*Characteristics.**Causes.**Class of persons usually affected.**Parts of the body usually attacked.**Prognosis.**Treatment.*

## WEAK ULCER.

*Characteristics.**Causes.**Class of persons usually affected.**Parts of the body usually attacked.**Prognosis.**Treatment.*

## INDOLENT ULCER.

*Characteristics.**Causes.**Class of persons usually affected.**Parts of the body usually attacked.**Prognosis.**Treatment.*

## IRRITABLE ULCER.

*Characteristics.**Causes.**Class of persons usually affected.**Parts of the body usually attacked.**Prognosis.**Treatment.*

## SPECIFIC ULCER.

*Characteristics.*—Depend on cause.*Causes.*—Cancer, scrofula, fungus, scorbutus, syphilis, &c.

The peculiarities of these ulcers will be pointed out under the heads of their respective causes.

## VARICOSE ULCER.

*Characteristics.**Causes.**Class of persons usually affected.**Parts of the body usually attacked.**Prognosis.**Treatment.*

## XI. MORTIFICATION, OR SPHACELUS.

*Definition.**Difference between gangrene and sphacelus.**Classification.*—Several terms are employed to designate the different groups of phenomena which characterise mortification under different circumstances. We have, for instance—

1. Hot, acute, traumatic, or inflammatory mortification.

2. Cold, or that which takes place without previous inflammation.

3. Humid, or that accompanied by the effusion of fluids.

4. Dry, or that in which little or no secretion or effusion occurs. From the fact of its being chiefly confined to old persons it is often called "Gangrene Senilis."



5. Chronic, or that form described by Pott, as attacking chiefly the extremities.

6. Hospital gangrene.

7. Epidemic gangrene.

8. Specific gangrene—example. Malignant pustule.

*Causes*—Various. It must be recollected that mortification may result from many causes besides inflammation. Nearly all of these may be ranged under four or five heads.

1. It may be occasioned by any cause capable of producing a cessation, or partial cessation, or even a feebleness of the circulation in a part—as inflammation, mechanical obstacles, debility, ossification of arteries, &c.

2. By any cause which occasions violent mechanical or chemical changes in the part, as contusions, lacerations, heat, cold, mineral acids, and caustic alkalis.

3. By any which, in consequence of their poisoning properties, will produce a deleterious influence upon the system at large, as the virus of rabid animals, and poisonous reptiles, and animal fluids the result of decomposition.

4. By any that will impair the powers of nutrition or furnish bad chyle. High living, or bad food, certain articles of food, (as ergot,) bad air, bad lodging, and certain trades by obliging individuals to deny themselves proper food, air, and exercise, will all predispose to mortification, and may produce it without local injury.

5. By any that will cause intense passions or emotions of the mind (See Langenbeck.)

*Manner in which these various causes operate upon the parts attacked.*

*Liability of tissues to mortification—some more liable than others.*

*Time required for the process of mortification to be completed.*—Depends on circumstances.

1. It may take place very slowly,

2. It may occur very rapidly.

3. It may be instantaneous.

*Symptoms.*—1. Constitutional. 2. Local.

*Process of sloughing.*—When in consequence of our remedies or the vix medicatrix naturæ, the progress of mortification is checked, a *distinct boundary line* is formed between the *living* and the *dead* tissue, and nature proceeds to *amputate*, as it were, the portion which has lost its vitality, by a process termed "*sloughing*," and where the bones are concerned by "*exfoliation*," the chief agent in the accomplishment of which was called by Hunter "*disjunctive absorption*."

The different changes which take place in this process described.

The period at which it occurs after mortification is completed depends on circumstances. State what these are. Condition of parts after the separation of the slough, and their manner of healing.

*Prognosis.*—The effect produced upon the system by the occurrence of mortification depends on the part involved. If the organ destroyed is one of importance, or vital, the death of the animal is either instantaneous or speedy. If, on the other hand, the part affected is not essential to life, sloughing takes place and the individual recovers. Sometimes, however, this process is so tedious, and the parts destroyed so extensive, that death ensues in consequence of debility and hectic fever. It is also modified by the kind of mortification present.

*Diagnosis.*—May be confounded with other discolorations of the skin

Positive signs of mortification must always be present before we pronounce upon the nature of the case. We must also be careful to ascertain the *depth* of the slough; for the skin alone may be affected, when there is every appearance of the whole limb being involved.

*Treatment.*—To prove of any advantage, so far as the affected part is concerned, our remedies must be applied in the stages of *gangrene*. They are also modified by the varieties of *gangrene*, the general condition of the patient, the character of the cause, &c. We may, however, lay down certain general indications to be observed in the management of all cases.

1. We must endeavour to apply such remedies as shall put a stop to the disease in the state of *gangrene*.

2. We must endeavour to arrest the progress of *mortification* when once formed, and at the same time lessen the violence of the local and general symptoms.

3. We must favour the separation of the slough, and when nature is incompetent to the task we must effect it for her.

a. In obeying the first general indication, we must always take into consideration the *cause* of the attack, and remove it, if possible, at once. If *inflammation* is the cause, *antiphlogistics*, general as well as local, are to be employed. If *strangulation*, or the *arrestation* of the *circulation* be the cause, the stricture must be divided by an operation, or relaxed by nauseants, &c. When produced by the *binding* of *aponeurosis*, or *skin*, as in carbuncle, free incisions are to be made. When *intense cold* is the cause, the temperature of the part must be gradually increased, and the subsequent inflammation treated on general principles, &c. The best *local remedies* as a general rule, in this stage, are *cold* and *astringent lotions*, or *warm fomentations*, *water dressings*, or *poultices*. *Leeches* may also be occasionally employed.

b. In carrying out the second general indication, we must resort to both constitutional and local means. Tonics, as bark, wine, opium, a good diet, and fresh air, will generally be required. The local remedies are, *incisions*, (to be used only when the tissues bind, or fluids are infiltrated to some extent,) *blisters*, *nit. argent.*, *creosote*, *yeast* or *carrot poultices*, *chloride of soda*, *pyroligneous acid*, and *carbonated water*. Charcoal and bark, once so highly esteemed, are not much employed at present.

c. The third general indication is answered by the application of warm dressings and poultices; removing the loose sloughs with the scissors and forceps; and by amputation.

*Period at which amputation should be resorted to.*—Depends on cause. In traumatic mortification remove the limb as soon as possible. In all other cases wait until the "*red line of demarcation*" is formed.

*Point at which amputation should be performed.*

In this stage it is usually necessary to support the constitution of the patient.

There are certain kinds of mortification which, from their peculiarities, deserve a separate notice. The first of these is

#### DRY GANGRENE.

*Definition.*

*Synonymes.*—Gangrene senilis—gangrene of the rich.

*Persons most liable.*—The old and dissipated. Men are more frequently attacked than females.

*Causes.*—Divided by Francois into two classes.



1. Those which operate through the medium of the *vascular system*, as inflammation of the vessels, formation of clots in their cavities, obliteration of vessels, ossification of arteries, diseases of the heart, diseases of the blood from bad food, as ergotted grain, &c., and mechanical injuries which obliterate vessels,

2. Those which produce their effect in consequence of either local or general debility of the *nervous system*, as palsy, old age, and the excessive debility of certain diseases, particularly phthisis pulmonalis.

*Symptoms*.—1. Constitutional. 2. Local. When ergot is the cause, the attack may commence with convulsions of the limbs and vertigo, or it may begin with the usual local symptoms of dry gangrene from other causes. The former was called by Linnæus “convulsio cerealis,” and by Wepfer, “convulsio ab ustaligine.” The latter, “necrosis ustilaginea,” by Sauvages.

*Prognosis*.—Usually unfavourable.

*Diagnosis*.—May be imitated by malingersers.

*Pathology*.—Still a matter of dispute. Cite the different views of Delpech, Cruveilhier, Dupuytren, Thuillier, Tessier, &c.

*Treatment*.—1. Constitutional. 2. Local.

#### INFANTILE GANGRENE.

*Definition*.

*Persons liable*.

*Parts usually attacked*.

*Causes*.—Question of its contagiousness.

*Symptoms*.

*Prognosis*.

*Diagnosis*.

*Treatment*.

#### CHRONIC MORTIFICATION.

*Definition*.

*Persons most liable*.

*Causes*.

*Symptoms*.

*Prognosis*.

*Diagnosis*.

*Treatment*.

#### HOSPITAL GANGRENE.

*Definition*.

*Synonymes*.—Phagedena gangrenæ; putrid or malignant ulcer; hospital sore; gangrena contagiosa.

*Causes*.

*Symptoms*.

*Prognosis*.

*Diagnosis*.

*Pathology*.

*Treatment*.

#### MALIGNANT PUSTULE AND CHARBON.

*Definition*.

*Causes*.

*Symptoms*.

*Prognosis*.

*Diagnosis*.

*Treatment*.

## VARIETIES OF INFLAMMATION.

### ERYSIPELAS.

*Definition.*—A peculiar form of inflammation attacking the skin and mucous membranes, taking its name from two Greek words which signify *red* and *skin*. It is also called St. Anthony's fire.

*Division.*—Almost every writer has given his own classification. I adopt that of Mr. Lawrence. He makes four varieties—1. Erythema. 2. Simple Erysipelas. 3. Œdematous-Erysipelas. 4. Phlegmonous Erysipelas.

The “*érysipelas ambulans vel erraticum*” of La Motte, and the “*universal erysipelas*” of Hoffman and others, being mere modifications of one form or the other of the varieties made by Lawrence, should not be considered as *peculiar* forms of the complaint. The division into *idiopathic* and *symptomatic* may be retained.

*Symptoms.*—Vary in the different forms.

*Seat of the disease.*—Commencing on the surface of the skin, it gradually becomes more profound until it involves in some cases the subjacent cellular and other tissues.

*Question of its contagiousness.*—Still a disputed point. For my own part I believe that it is not. It may be epidemic.

*Causes.*—Predisposing—constitutional and local.

*Prognosis.*—Depends on location and extent—the health and condition of the patient.

*Diagnosis.*—May be confounded with common phlegmon.

*Treatment.*—Varies somewhat with the kind of erysipelas. May be divided into—1. Constitutional. 2. Local.

Being essentially inflammatory, *antiphlogistic* remedies are required in the first stage. Emetics are often useful. In phlegmonous and œdematous erysipelas, when sloughing occurs, it often becomes necessary to support the constitution.

The *local* remedies are very numerous. 1st, cold; 2d, leeching; 3d, scarifications; 4th, incisions; 5th, blisters; 6th, argent. nit. as applied by Davidson, or after the method of Higginbottom; 7th, tinct. of iodine; 8th, British oil; 9th, ungt. hyd. mit. 10th, dry powders: 11th, compression, as recommended by Velpeau and Bretonneau. Examination of the value of these different agents.

### ANTHRAX, OR CARBUNCLE.

*Definition.*—A deep-seated, circumscribed inflammation of the skin and cellular tissue, characterized by its hardness, peculiar burning pain, and termination in gangrene.

*Varieties.*—Benign and malignant.

*Causes.*—Constitutional and local.

*Symptoms.*—Vary with stage.

*Diagnosis.*—Pustule maligne may be mistaken for it; also, common furuncle, and erysipelas.

*Prognosis.*—Depends on location and general health of patient.

*Termination.*

*Treatment.*—Varies with stage.

### FURUNCULUS OR BOIL.

*Definition.*

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Termination.*

*Treatment.*

#### PERNIO, OR CHILBLAIN.

*Definition.*—Specific inflammation. The result of cold.

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Treatment.*—Divided into that proper in the early stages, and that required after vesication and ulceration have taken place.

#### FROST-BITE.

*Definition.*—A form of inflammation the result of the application of intense cold to any part of the body.

*Symptoms.*—Constitutional and local.

*Diagnosis.*

*Prognosis.*

*Treatment.*—Varies with degree, location, and stage.

#### BURNS.

*Definition.*

*Causes.*

*Classification.*—Hildanus, Boyer, Thompson and others make *three* kinds.

1. *Superficial*, involving merely the outer surface of the skin, and terminating always in resolution,

2. *Vesicular*, or *ulcerated*, in which the cuticle is raised into blisters.<sup>2</sup>

3. *Sloughing*, in which the cutis is destroyed either immediately or subsequently, and forms either a "soft slough or hard eschar."

This classification being simple is the one most generally adopted, but that of Dupuytren is much more scientific; being based as it is upon the nature of the textures and organs involved. In this, *six* varieties or degrees are made.

1. Erythema, or superficial phlogosis of the skin without vesicles.

2. Inflammation of the skin, with detachment of the cuticle and formation of vesicles.

3. Destruction of the corpus papillare, and rete mucosum.

4. Complete disorganization of the cutis down to the cellular tissue.

5. Conversion of all the superficial textures and muscles into eschars.

6. Carbonization of the whole thickness of the burnt part.

*Symptoms.*—Vary with the degree of violence with which the causes producing them have operated. Divided into—1. Constitutional. 2. Local.

*Diagnosis.*—May be confounded with erysipelas.

*Prognosis.*—Deduced from extent, depth, and situation; age and constitution of the patient; and the character of the cause.

*Periods of danger.*—According to Dupuytren there are four:

1. The stage of irritation, or the period of the first shock on the system.

2. The stage of inflammation.

3. The stage of suppuration.

4. The stage of exhaustion or hectic.

*Post mortem.*

*Treatment.*—Varies with the degree, &c.

In the *first* and *second* degree, we must endeavour, by both constitutional and local measures, to prevent inflammation or limit its extension, and relieve pain. Should there be no *chill*, the best topical applications, at first, are cooling refrigerant lotions; should fever supervene, low diet, venesection, topical bleedings, and cooling medicines, must be administered; and to allay pain, it is proper to give anodynes.

When the patient is cool or prostrated, wait for reaction or promote it, and in the mean time cover the burnt part with raw cotton.

When reaction takes place, then resort to the antiphlogistic system.

When vesicles form, and suppuration takes place, apply, instead of the cold, the linimentum aquæ calcis, or a mild poultice.

The vesicles should always be punctured with a needle, and the fluid thus evacuated.

The cuticle must not be removed.

In the *third* and *fourth* degrees, the same general rules are to be observed.

Where the pus collects under the slough, free incisions are to be made, and poultices applied until the slough is detached, or until healthy granulations form.

In the *fifth* and *sixth* degrees, the patient is generally prostrated, and we have to resort at once to stimulants. Some advise *local stimulants*, or “the calefacient treatment;” but as the parts are nearly if not entirely destroyed, and must be detached by sloughing, it is best to apply warm poultices at once. During the detachment of the slough, the patient’s strength must be supported.

The ulcers resulting from the detachment of the slough are generally indolent, and must be treated on general principles.

Where a limb is entirely destroyed, amputation must be resorted to as soon as reaction takes place.

*Local treatment during cicatrization to prevent deformity.*

*Local treatment of the deformities arising from the unfavourable cicatrization of burns.*

#### SCORBUTIC INFLAMMATION, OR SCURVY.

*Definition.*

*Causes.*

*Symptoms.*

*Pathology.*

*Prognosis.*

*Diagnosis.*

*Treatment.*

#### SCROFULOUS INFLAMMATION, OR SCROFULA.

*Definition.*

*Synonymes.*

*Tissues most liable to be attacked.*

*Age at which the disease usually manifests itself.*

*Causes.*—1. Hereditary. 2. Accidental.

*Characteristics of the “scrofulous diathesis.”*

*Symptoms.*—1. Constitutional. 2. Local. Both are modified by the organ or organs attacked.

*Diagnosis.*

*Prognosis.*

*Pathology.*

*Treatment.*—1. Local. 2. Constitutional.

## WOUNDS.

**DEFINITION.**—A recent solution of continuity in the soft parts suddenly occasioned by external causes, and attended at first by more or less hemorrhage.—(Cooper.)

**OBJECTIONS TO THIS USUALLY ACCEPTED DEFINITION.**—A wound may be produced by violent action of the muscles alone; and by the protrusion of a fragment of bone. We may also have a wound occurring in bone.

**CLASSIFICATION OF WOUNDS.**

*First division*.—Is based upon the nature of the instrument inflicting the wound. Thus we have *incised, punctured, lacerated, contused, and gunshot* wounds.

*Second division*.—Is based upon the introduction of some venomous morbid or putrid matter, into the wounded part. Hence we have *poisoned, specific, and dissecting* wounds.

*Third division*.—Is based on the regions or parts involved. Thus we have wounds of the *head, face, chest, abdomen, &c.*

*Fourth division*.—Wounds are also divided into the *simple and complicated*.

**DANGERS OF WOUNDS.**—These depend on—1st, the size or the extent of injury; 2d, the weakness or strength of the parts involved; 3d, the importance of the organ; 4th, the size of the bloodvessels involved; 5th, the kind of vessel (artery or vein); 6th, the diathesis of patient; 7th, the age of patient.

**CAUSES OF DEATH.**—1st, hemorrhage; 2d, tetanus; 3d, traumatic fever; 4th, erysipelas; 5th, hectic fever; 6th, gangrene; 7th, metastatic abscess.

**PROCESS OF HEALING.**—Until recently, only *two methods* described; union by the *first intention*, and union by *granulation*, or the *second intention*. Professor M-Cartney has established the existence of two others, and we may therefore make four different processes of union, viz.:

1. Immediate union.
2. Mediate union by lymph or blood, or union by the first intention.
3. Union by the modelling process.
4. Mediate, by granulation, or by the second intention of Hunter.

**OBJECTIONS TO McCARTNEY'S VIEWS.**

**MODE OF ORGANIZATION OF THE LYMPH AND BLOOD.**

**DIFFERENCE BETWEEN HUNTER AND McCARTNEY RELATIVE TO THE NECESSARY PRESENCE OF INFLAMMATION IN THE HEALING OF ALL WOUNDS.**

**COMPARATIVE ADVANTAGES OF THE DIFFERENT MODES OF UNION.**

*First* and *second* should generally be attempted; because when either takes place we save *time* and *pain*, and obtain a *strong* and generally but *slightly deformed* cicatrix.

State the objections urged by many of the French authors and others against these two modes of union in large wounds.

**CIRCUMSTANCES PREVENTING UNION BY THE IMMEDIATE OR MEDIATE PROCESSES.**—Divided into 1, constitutional; 2, local.

First or constitutional.

1. Bad habit of body.
2. Diseases of various kinds.
3. Simple fever.

4. Vitiated atmosphere in hospitals, &c.

5. Epidemic influences.

Second, *or local*.

1. Atmospheric air.

2. Foreign bodies lodged in the wound.

3. Large coagula of blood.

4. Laceration or severe contusion of the parts.

5. Faulty dressings.

CHARACTER OF THE TISSUE BY WHICH WOUNDS ARE UNITED.—Already alluded to. It is a singular fact, that with the exception of bone, all tissues unite by a substance different from themselves.

The different classes of wounds may next be considered; and first of

### INCISED WOUNDS.

*Definition.*

*Extent and direction.*—Always to be regarded.

*Characteristics.*—Pain, gaping, hemorrhage.

The pain is owing to lesion of the nerves; the gaping to the ordinary elasticity and contractility of the parts, and also to the situation of the wound. The hemorrhage proceeds from a wound of an artery, or vein, or both, and its character is modified accordingly. State these modifications. Its activity is dependent upon the character of the wound, and the size of the vessel.

*Prognosis.*

*Treatment.*—General indications.

1. Arrest the hemorrhage.

2. Remove foreign bodies.

3. Approximate and retain the sides of the wound in contact.

4. Prevent or subdue inflammation.

5. Protect the wound from injury by appropriate dressings.

*First indication.*—Hemorrhage may be arrested either by an effort of nature, or by the assistance of the surgeon. Explain the process by which the bleeding is *spontaneously* arrested. We are not to wait for this, however, but must resort to the various agents afforded by our science. These are numerous, and are to be modified or varied according to circumstances.

1. When the vessel is deep and beyond our reach,—as in wounds of chest, abdomen, &c.—our best remedies are bleeding, digitalis, cold, rest, low diet, and positive quietude of mind.

2. When the vessel is accessible, we may resort to

a. The ligature.

b. Torsion.

c. Machure.

d. Refoulement or, reduplication.

e. Compression.

f. Refrigerants.

g. Styptics.

h. Suture,

i. Plugging.

j. Seton.

k. Acupuncture.

l. Electro-puncture.

The most important of these agents is the



## LIGATURE.

*History.*—Mentioned by Celsus ; but not generally employed until the time of Paré.

*Effect on an artery.*

*Effect on a vein.*

*Changes which take place in the blood contained in the vessel.*

*Changes which take place in the vessel itself.*

*Manner in which the ligature is discharged.*

*Cause of danger when the ligature comes away.*

*Time required for the obliteration of the vessel.*

*Materials of which ligatures are usually made.*

*Shape and size of ligature.*

*Mode of tying the ligature.*

*Method of applying a ligature.*—Depends on the location of the vessel.

1. When the vessel opens on a surface, as in the wounds of amputation, &c., we require a *tenaculum*, or *artery forceps*.

2. When the vessel is deep-seated, or when we wish to cast a ligature in the course of a vessel, as in aneurism, we may use the various *aneurismal needles*, or a *bent probe*. Objections to the needles. In all large wounds it is well to apply a ligature to *both ends of the vessel*. Why ?

*Subcutaneous ligature.*

*Ligature d'attente, or ligature of reserve.*

*Scarpa's ligature.*

*Ligature and section of the vessel.*

*Temporary ligatures.*

## TORSION.

*Definition.*

*History.*

*Arteries to which it is considered applicable.*

*Mode of performance.*

*Objections to its employment.*

## MACHURE.

*Definition.*

*History.*

*Arteries to which it is considered applicable.*

*Mode of performance.*

*Objections.*

## REFOULEMENT, OR INVERSION.

*Definition.*

*History.*

*Arteries to which it is considered applicable.*

*Mode of performance.*

*Objections.*

## COMPRESSION.

*Importance.*—Useful either as a *temporary* or *permanent* agent.

*Points upon which it may be applied.*—Either directly upon the bleeding surface, or at some distance from it.

*Class of wounds in which it is most useful.*—Wounds of *extremities*, or over bones and firm tissues.

*Agents of compression.*—1st, compresses ; 2d, rollers ; 3d, hand of assistant ; 4th, tourniquet ; 5th, garot ; 6th, tissue itself.

## REFRIGERANTS.

*Cases to which they are applicable.*

*Agents usually employed.*—Cold air, cold water, ice, &c.

## STYPTICS AND ABSORBENTS.

*Cases to which they are applicable.*

*Agents usually employed.*—Salts of the metals, kreosote, sponge, agaric, lint, cobweb, dry powders, &c.

## CAUTERY AND CAUSTICS.

*Cases to which they are applicable.*

*Heat at which the cautery should be applied.*

*Agents employed.*—Metallic bodies of different shapes, mineral acids, argent. nit., &c.

## SUTURE.

*Mode of application.*

*Cases to which it is applicable.*

## PLUGGING.

*Cases to which it is applicable.*

*Manner of applying it.*—Speak of Sarra's proposition to "plug the artery" in ordinary hemorrhage,

## SETON.

*Mode of application, &c.*

## ACUPUNCTURE.

*Mode of application, &c.*

## ELECTRO-PUNCTURE.

*Mode of application, &c.*

*Manner in which the circulation is carried on in a limb, after the obliteration of a large artery.*

*Second indication.*—Having arrested the hemorrhage, the next indication is to remove foreign bodies.

Character of these, generally speaking. Should coagulated blood be considered a foreign body?

*Manner of removing these bodies.*

*Third Indication.*—The next indication is to bring the sides of the wound in contact, and retain them in this position.

Agents employed to fulfil this indication. 1. Position. 2. Sutures of different kinds. 3. Adhesive straps. 4. The rollers. 5. Splints.

*Fourth indication.*—Protecting the wound from injury, is the next indication.

Agents employed to fulfil this indication. Much more simple at present than formerly. The lighter the dressing the better, when we wish union by the first intention. Cold water dressing. When union by the *second intention of Hunter* is desired, the best top dressing is the "warm water dressing," or poultice.

*Fifth indication.*—To fulfil this indication, antiphlogistics, both general and local are usually required.

## LACERATED WOUNDS.

*Definition*

*Causes.*

*Characteristics.*

*Prognosis.*

*Treatment.*—General indications.

1. Arrest the hemorrhage when it exists.
2. Attempt, if possible, union by the "immediate or mediate" processes.  
Mode of dressing to accomplish this. Irrigation and water dressings.
3. When suppuration takes place, promote the secretion by a poultice, or warm water dressing.
4. Keep down inflammation at first, but when suppuration is profuse, support the constitution.
5. When the extremities are involved, the question of amputation may occur.

### CONTUSED WOUNDS.

*Definition.*

*Causes.*

*Characteristics.*

*Prognosis.*

*Terminations.*

*Treatment.*—General indications.

1. When the contusion is complicated with a wound of the integuments, close the latter as soon as the hemorrhage (where it exists) is arrested, and foreign bodies removed.
2. Keep down inflammation by antiphlogistics, both local and general. Dress lightly, &c.
3. In severe contusions, it is often necessary, at first to *stimulate* the patient, but this should only be done when the prostration is great.
4. After the inflammation becomes chronic, or when the blood is not readily absorbed, use stimulating frictions, bandages, &c.

### PUNCTURED WOUNDS.

*Definition.*

*Causes.*

*Characteristics.*

*Prognosis.*

*Treatment.*—General indications.

### PENETRATING WOUNDS.

*Definition.*

*Causes.*

*Characteristics.*

*Prognosis.*

*Treatment.*—General indications.

### POISONED WOUNDS.

*Definition.*

*Causes.*

*Characteristics.*

*Prognosis.*

*Treatment.*—Depends on the character of the cause.

1. When they are produced by the sting of insects, the remedies are—*cold applications, volatile alkali, saline solutions* to the part affected; and occasionally *bleeding, diet and purgatives* are required.
2. When they are produced by the bites of venomous or rabid animals, the remedies are a *ligature above the wound, excision of the part, cupping,*

or *suction of the wound, caustics poultices*, and often *constitutional remedies*, according to the condition of the patient.

3. *Dissecting wounds* are best treated by *suction, caustic, leeches, a blister above the wound, a poultice or cold to the part*, and constitutional remedies according to circumstances.

#### RABIES.

*Definition.*

*Causes.*

*Time of appearance after the reception of the injury.*

*Symptoms.*

*Pathology.*

*Prognosis.*

*Diagnosis.*

*Treatment.*

#### GUN-SHOT WOUNDS.

*Definition.*

*Varieties.*

*Characteristics.*—Constitutional and local.

*Wind wounds.*—How produced.

*Gun-shot wounds usually contain foreign bodies.*

*Pathology of the wound.*

*Prognosis.*

*Treatment.*—Several indications. Modified by nature of wound.

1. Attend to general condition of patient, at the time the wound is received.
  2. Arrest the hemorrhage where it exists.
  3. Examine wound.
  4. Remove foreign bodies, if possible.
  5. Dress the wound. Cold application should first be tried, and if these fail to afford relief, apply warm or hot.
  6. Guard against secondary hemorrhage.
  7. Prevent the forming of pus.
  8. Prevent inflammation if necessary by *antiphlogistics*.
  9. Support the general health if necessary after suppuration is established.
  10. Heal sinuses.
-

## SECOND DIVISION, OR DISEASES OF THE TISSUES.

### 1. DISEASES OF THE BONES.

#### GENERAL REMARKS.

BONES MOST LIABLE TO DISEASE.

CAUSES OF DISEASE.

EFFECTS ON CONSTITUTION.

CLASSIFICATION.—All diseases of the bones may be ranged under three heads.

1. The non-malignant diseases.
2. The malignant diseases.
3. Wounds and fractures of bones, and their occasional results.

#### FIRST HEAD, OR NON-MALIGNANT DISEASES.

- a. Neuralgia.
- b. Atrophy.
- c. Hypertrophy.
- d. Osteitis.
- e. Abscess.
- f. Ulceration.
- g. Necrosis.
- h. Mollities ossium.
- i. Fragilitas ossium.
- j. Rachitis.
- k. Tubercle in bone.
- l. Osseous aneurism.
- m. Exostosis.
- n. Hydatid encysted tumour.
- o. Serous encysted tumour, or spina ventosa.

#### SECOND HEAD, OR MALIGNANT DISEASES.

- a. Osteo-sarcoma.
- b. Medullary sarcoma.
- c. Fibrous sarcoma.
- d. Fungus Hematodes.
- e. Melanosis.

#### *First Head.*

#### I. NEURALGIA.

*Diagnosis.*

*Causes.*

*Symptoms.*

*Prognosis.*

*Treatment.*

## II. ATROPHY OF BONE.

*Definition.*

*Varieties.*

*Causes.*—1, diseases of various kinds; 2, retardation of structural growth; 3, old age.

*Effect upon the strength of the bone.*

*Apparance of the bone.*

*Analysis of atrophied bone.*

*Treatment.*

## III. HYPERTROPHY.

*Definition.*

*Varieties.*

*Causes.*—1, exercise; 2, excessive nutrition in different bones; 3, inflammation; 4, degeneration of soft deposits upon bone, the result of periosteal inflammation.

*Effect upon the strength of the bone.*

*Symptoms.*

*Appearance of bone.*

*Treatment.*

## IV. OSTEITIS.

*Definition.*

*Question of its possible occurrence.*

*Varieties.*—1. Acute. 2. Chronic.

*Persons most liable.*

*Bones most frequently attacked.*

*Causes.*—1. Constitutional. 2. Local.

*Symptoms.*

*Diagnosis.*—May be confounded most readily with periostitis and endostitis.

*Prognosis.*

*Terminations.*—Resolution, atrophy, hypertrophy, suppuration, ulceration, mortification.

*Dissection.*

*Treatment.*—Depends on variety of inflammation, its intensity, and the bone attacked. The remedies required may be either general or local, or both combined.

## V. ABSCESS IN BONE.

*Location of matter.*

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## VI. CARIES, OR ULCERATION IN BONE.

*Definition.*

*Confusion among authors as to its precise nature.*

*Bones most liable to be involved.*

*Varieties.*—Simple, syphilitic, strumous, malignant, &c.

*Causes.*—1. Constitutional. 2. Local. The seat of the disease, when



*constitutional* causes operate in its production, is modified very much by the *character* of the cause.

*Symptoms*.—Constitutional and local. Modified by the cause, stage, location and extent of the disease. Usually three stages.

*Diagnosis*.

*Prognosis*.—Often confounded with osteitis, periostitis, endostitis, necrosis.

*Dissection*.

*Chemical analysis*.

*Treatment*.—Both constitutional and local remedies will usually be required, and these must be modified to suit the stage, intensity, and cause of the disease. In the *first stage*, antiphlogistics are usually required. In the *second stage*, emollients or stimulants, to change the character of the ulcer, are generally employed. In the *third*, we must either *cut out the diseased bone, destroy its vitality, or remove the limb*.

The cause must always be removed, if possible; and if *specific* in its character, *specific* remedies or alteratives are to be employed.

## VII. NECROSIS.

*Definition*.

*Confusion among authors as to its precise character*. Louis was the first to describe it accurately.

*Bones most liable*.

*Causes*.—1. Constitutional. 2. Local. Most of these operate through the medium of the periosteum, either *internal* or *external*. Some affect the bone primarily.

*Remarks in reference to the influence of the periosteum*.

*Varieties*.—1. EXTERNAL. 2. INTERNAL. 3. COMPLETE.

*Symptoms*.—Constitutional and local. Often obscure. We have usually *three* distinct stages in the progress of the disease.

1. The inflammatory stage.
2. The stage of suppuration and detachment.
3. The stages of reparation.

In *external* or *superficial* necrosis, the local symptoms, in the *first stage*, are a dull or acute pain, soon succeeded by a flattish tumour, in which fluctuation is after a time observed. The skin next changes its colour, ulcerates, and pus is discharged. There is always more or less fever.

In the *second stage*, the swelling diminishes in size, the bone is felt *bare, rough, or smooth*, according to the nature of the action preceding its death, often rings when struck, and when we can see it is either *whiter* or *darker* than natural. The pus discharged is either laudable or unhealthy. There is sometimes inflammatory fever in this stage, but oftener we have *hectic*. The bone is gradually loosened and detached by a process termed "*exfoliation*," which is very analogous to sloughing of the soft parts.

In the *third stage*, the local symptoms become milder, the constitution improves, and the new bone is formed.

In *internal* or *complete* necrosis, all the symptoms are more severe; and in the *second stage*, the swelling does not diminish in size so much as in external necrosis.

*Process of separation described*.

*Manner in which the sequestrum or dead bone is disposed of*.—Depends upon its being *external, internal* or *complete*.

*Process of reparation described.*—Varies in the different kinds of necrosis.

*Character of the new bone and its various stages of organization.*

*Cloacæ.*—How formed, shape, &c.

*Prognosis.*

*Diagnosis.*

*Treatment.*—General indications.

1. Remove the causes.
2. Palliate the symptoms.
3. Remove the dead bone after its detachment, and sometimes detach it with our instruments.
4. Treat the limb, where the entire shaft of a bone has been destroyed, as you would a fracture of the same part, until the new bone is sufficiently firm.

## VIII. MOLLITIES OSSIUM.

*Definition.*

*Causes.*

*Persons most liable to be attacked.*

*Symptoms.*

*Prognosis.*

*Diagnosis.*

*Pathology.*

*Treatment.*

## IX. FRAGILITAS OSSIUM.

*Definition.*

*Causes.*

*Persons most liable to be attacked.*

*Symptoms.*

*Prognosis.*

*Diagnosis.*

*Pathology.*

*Treatment.*

## X. RACHITIS.

*Definition.*

*Causes.*

*Persons most liable to be attacked.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Pathology.*

*Treatment.*

## XI. TUBERCLE IN BONE.

*Varieties.*—1. ENCYSTED TUBERCLE. 2. TUBERCULAR INFILTRATION

*Characteristics of first form, or encysted tubercle.*

*Effects on surrounding parts.*

*Similarity between encysted tubercle in bone, and tubercle in other tissues.*

—In bone, as in the lungs, &c., the crude tubercle proceeds from the *semi-transparent gray granulation*, of Laennec and others.

*Process of reparation after softening of tubercle.*

*Tubercular pouches.*

*Results of these collections.*—1. They may be absorbed. 2. They may cause suppuration and ulceration in the bone. 3. They may serve as the nidus of new tubercles.

*Stages in the development and maturation of encysted tubercle.*

1. Semi-transparent gray granulations.
2. Crude, opaque, encysted tubercle.
3. Bony excavation, loss of substance in the bone.
4. Evacuation of the tubercular cavity.
5. Hypertrophy of the cyst, obliteration of the cavity, recovery, (Nelaton.)

*Characteristics of second form, or tubercular infiltration.*—This may exist alone, or in connection with the other variety. It usually presents *two different conditions.*

1. *Semi-transparent infiltration.*
2. *Puriform or opaque infiltration.*

*Difference between the two.*

*Effects on surrounding parts.*—Invariably causes necrosis of the part attacked, and also produces purulent infiltration. It may also occasion tubercular cysts, caries, &c.

*Process of reparation after the bone is affected or destroyed.*

*Stages in the development and termination of this form of tubercle.*

1. Semi-transparent gray infiltration..
2. Interstitial hypertrophy of the bony tissue, or ivory degeneration.
3. Puriform infiltration.
4. Necrosis of the infiltrated portion.
5. Sequestration—foreign body—(Nelaton.)

*Diagnosis of tubercle in bone.*

*Prognosis.*

*Seat of the disease.*

*Persons most liable.*

*Diseases produced by these tubercular deposits.*

1. Certain forms of diseased spine.
2. Certain forms of white swelling.
3. Certain diseases of the smaller joints.
4. Certain diseases of the inner ear.

## XII. OSSEOUS ANEURISM.

*Definition.*

*History.*

*Causes.*

*Location.*

*Persons most liable.*

*Symptoms.*

*Effects on adjacent parts.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## XIII. EXOSTOSIS, OR SIMPLE BONY TUMOURS.

*Definition.*

*Classification.*

1. Those which originate in the periosteum, or sub-periosteal cellular tissue, and may be termed *external periosteal* or *peripheral*.

2. Those which originate in the substance of the bone, or in its cavity, and may be called *internal* or *parenchymatous*.

3. The *cartilaginous*.

4. The *ivory-like*.

5. *General Exostosis* involving the entire bone.

6. *Partial Exostosis*, when the disease is confined to a portion of the bone.

*Mode of development of the periosteal tumours.*

*Mode of development of the parenchymatous tumours.*

*Liability*.—Some bones more frequently attacked than others.

*Number of tumours.*

*Size of tumour.*

*Colour of tumour.*

*Form of tumour.*

*Causes of disease.*

*Symptoms*.—Vary with the *cause*, *structure*, and *shape* of tumour, its *location*, and the *rapidity* with which it grows.

*Effects on adjacent parts.*

*Diagnosis.*

*Prognosis.*

*Terminations*.—1. Resolution. 2. Conversion into other tissues. 3. Necrosis. 4. Suppuration.

*Treatment*.—1. Medical. 2. Surgical.

## XVI. HYDATID ENCYSTED TUMOUR OF BONE.

*Definition.*

*Causes.*

*Part of the bone most liable to be attacked.*

*Effect upon the bone.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## XV. SEROUS ENCYSTED TUMOUR OF BONE.

*Definition.*

*Synonymes*.—*Spina ventosa*, fibro-cellular tumour, wind ball, &c.

*Causes.*

*Part of the bone most liable to be attacked.*

*Usual situation of the tumour.*

*Effect upon the bone.*

*Size.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment*.—Depends upon the size and location of the tumour, and the nature of its contents. Several general methods.

1. Puncturing or simply opening the tumour.

2. Puncture followed by seton.

3. Puncture followed by stimulating fluids.

4. Removal of the semi-solid contents of the tumour, and pressure.

5. Removal of the tumour, or amputation of the limb when it occurs on an extremity.

### *Second Head.*

#### XVI. OSTEO-SARCOMA.

*Definition.*

*Causes.*—1. Constitutional. 2. Local.

*Bones most frequently attacked.*

*Age at which it generally occurs.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*—Removal. Amputate at a joint if possible.

#### XVII. MEDULLARY SARCOMA.

For the characteristics of this disease, see "Cancer."

#### XVIII. FIBROUS SARCOMA.

For the characteristics of this disease, see chapter on diseases of the "Fibrous Tissue."

#### XIX. FUNGUS HEMATODES.

For the characteristics of this disease, see "Cancer."

#### XX. MELANOSIS.

For the characteristics of this disease, see "Cancer."

### *Third Head.*

#### XXI. WOUNDS OF BONE.

*Definition.*

*Causes.*

*Bones most usually involved.*

*Characteristics of wounds in bone.*

*Prognosis.*

*Diagnosis.*

*Process of union.*

*Treatment.*

#### XXII. FRACTURES IN GENERAL.

*Definition.*

*Causes.*—1. Predisposing or remote. 2. Proximate or efficient. The first class may be subdivided into the *local* and *general*.

(1.) The local predisposing causes are—

- a. The situation of a bone.
- b. The function of a bone.
- c. Some local disease.

The general predisposing causes are—

- a. The diathesis of the individual.
- b. The diseases of the individual.
- c. The age.

d. The season of the year.

e. Sex.

(2.) The efficient causes of fracture are—

a. Muscular action.

b. External violence, directly or indirectly applied.

*Bones most liable to fracture.* Refer to statistical tables.

*Classification of fractures.*

The first division is based upon the relation of the solution of continuity to the axis of the bone. Thus we have—

a. Transverse fracture.

b. Oblique or obtuse fracture.

c. Longitudinal or parallel fracture.

The second division is based upon the appearance of the fracture, which is always modified by the kind of force producing the injury, and the bone involved. Thus we have—

a. Fissures.

b. Stellated fracture.

c. Depressed or indented fracture.

The third division is based upon the displacements of the fragments. Thus we have—

a. Longitudinal displacement, or shortened fracture.

b. Lateral displacement, or displacement in the diameter of the bone.

c. Rotatory displacement, or displacement in the circumference of the bone.

d. Angular displacement, or displacement in the direction of the bone.

e. Impacted fracture.

Causes of displacement:

1. External violence, either direct or indirect.

2. Weight of the body in falling.

3. Weight of the limb.

4. Muscular contraction. Refer to Boyer's remarks on the influence of the different sets of muscles attached to the fragments. When the muscles are paralysed by the blow, there is often no displacement of the fragments. Nor is displacement invariably present, even when the muscles retain their power. State the causes of this.

The fourth division is based upon the degree of injury done to the parts around the fracture, and to the bone itself. Thus we have—

a. Simple fracture.

b. Compound or open fracture.

c. Complicated fracture.

d. Comminuted fracture.

*Symptoms of fracture.*—1. Rational or physiological. 2. Sensible or physical.

First or rational signs.

a. Pain.

b. Numbness.

c. Loss of voluntary motion.

d. Occasional constitutional disturbance.

These symptoms are never to be relied on, as they are present in other injuries.

Second, or physical signs.

a. Change in natural form of limb.

b. Unnatural mobility of the part at the seat of fracture.

c. Change in the length of the limb.

d. Crepitus.



These symptoms are more to be relied on; yet it must be recollected that change in the natural form and length of a limb are present in luxations and sprains, and that crepitus may be occasioned by inspissation of the synovial fluid—the riding of one bone upon another in certain luxations—sanguineous tumours—the motion of tendons in their sheaths, and emphysematous collections. It may also be absent in fracture, or very indistinct. Lisfranc in such cases proposes the employment of the stethoscope in our examination.

*Diagnosis.*—Fractures may be confounded with—1. Luxations. 2. Bent bones. 3. Partial fracture. 4. Sprains. State the characteristics of each.

*Prognosis.*—Depends on a variety of circumstances. It is modified, for example, by

- a. The size of the bone.
- b. The number of muscles attached to the fragments.
- c. The seat of fracture.
- d. The relation of the bone to one of the great cavities.
- e. The extent of injury to the soft parts.
- f. The character of the force producing the fracture.
- g. The direction of the fracture.
- h. The age of the patient.
- i. The health of the patient.
- j. The season of the year.
- k. The extremity involved.
- l. The existence of more than one fracture.
- m. The degree of injury to the bone broken.
- n. The existence of a luxation along with the fracture.

*The process of the reparation of fractures, or the formation of callus.*

Two kinds of callus.

- a. Provisional, or that which serves the purpose of uniting the fragments for a time, and is then removed.
- b. Definitive, or that which unites the fragments permanently.

There are several stages in the organization of callus which deserve attention. We have

1. The effusion of blood and lymph.
2. The absorption of serum and the colouring matter of the blood, the inspissation of the lymph, and the union of the soft parts.
3. The conversion of the lymph into cartilage, which forms a distinct *pin* in the cavity of the bone, and a *ring* around the seat of fracture.
4. Ossification of the cartilage in the spongy tissue of the bone.
5. Ossification of the cartilage between the compact portion of the fragments.
6. The removal of the provisional callus, and the restoration of the cavity of the bone.

*Time required for the formation of definitive callus.*—Depends upon a variety of circumstances. Usually in adults, and in large bones, from eight to twelve months are requisite. The limb, however, is useful long before the process is completed.

*Agents concerned in the formation of callus.*

1. The periosteum. Not essential, though highly important in the formation of bone.
2. The vessels of the adjacent soft parts.
3. The bone itself.
4. The internal periosteum.

5. The absorbents which remove provisional callus and model the bone.

*Mode of union in flat bones.*

*Strength of bones after the fracture is cured.*—They are sometimes stronger at others weaker than natural. The location of the fracture as regards the nutritious arteries, and the activity of absorption, are the modifying agents here.

*Treatment.*—General indications.

1. The mode of moving patients in severe fractures from the spot at which the injury occurred, is a matter well deserving the attention of the surgeon.

2. As there is usually displacement of the fragments, "*reduction*" or setting will be required. This may be effected by *extension, counter-extension, relaxation of the muscles, and coaptation*. We are often resisted in the accomplishment of this indication by *spasm of the muscles, binding of the soft parts, and binding of the bones*.—Mode of overcoming these difficulties explained. Value of mydiotomy in these cases discussed.

3. To prevent a recurrence of the displacements, *mechanical means must be applied*, and the part guarded against all motion. This indication is occasioned by the employment of *rest, favourable position, bandages, compresses, cushions, and various apparatus, or dressings*.

4. As inflammatory symptoms may supervene, measures must be taken to prevent their occurrence.

5. Spasm and pain often occur after dressing, and these symptoms must be relieved by anodynes, cold or warm irrigation, sometimes by changing the dressings, and occasionally by bloodletting. Be careful, however, not to deplete too much, as callus will not be formed unless a certain degree of excitement is allowed to take place in the seat of fracture.

6. In applying the dressings be careful to protect parts liable to pressure, or that seem chafed or swollen, by *straps, cushions and proper position*.

7. Carefully inspect the dressings daily, but do not disturb them so long as they are steady and properly adjusted.

8. When phlyctanæ form, carefully puncture them with a needle, but do not allow the cuticle to be removed.

9. Should superficial or deep-seated suppuration ensue, it must be treated on principles already laid down.

10. During convalescence the patient requires strict attention in order to prevent the occurrence of "*secondary fracture*."

11. After callus is formed, the parts, especially the joints, remain rigid. The indication here is to relax this rigidity by *friction, passive motion, warm douche, vapour bath, electricity and galvanism*.

12. Finally, *set the fracture* as soon as possible. Do not wait, as some advise, until swelling and inflammation have occurred and subsided.

*General methods of treatment:*

1. That in which the limb is kept extended in the *horizontal* position.

2. That in which it is maintained in the *semiflexed* position.

3. That in which it is encased in some *unyielding and permanent* dressing, as the "*starch bandage*," or plaster mould. This dressing is sometimes called the "*immoveable apparatus*."

4. That in which the limb is *suspended*. This method is technically called "*hypouarthecia*." It originated with Sauter and Mayor.

5. That in which the dressing is composed of handkerchiefs, variously folded. This method, from having been introduced by Mayor, is called "*Mayor's handkerchief system*."

6. That in which the ordinary splints and bandages are employed.

*Review of these different methods.*

## COMPOUND FRACTURES.

*Definition.*

*Causes.*—1. The fragments of bone may be driven through the skin.

2. The integuments may be wounded by the body causing the fracture.

3. Sloughing may open the integuments.

4. An abscess may form and open.

5. Finally, pressure upon some projecting point may cause its ulceration.

*Dangers.*—1. Immediate shock to the system, from injury to the nerves, or from loss of blood.

2. Inflammation and fever.

3. Hectic fever.

4. Tetanus.

*Question of amputation.*—When called to a case of compound fracture, we are first to determine between the propriety of amputation, and an attempt to save the limb. No fixed rules in regard to this operation can be laid down, but we must take into consideration several points.

1. The age of the patient.

2. His constitution.

3. His habits.

4. His position in society.

5. His means of obtaining proper nursing, food, &c., during the treatment, if we attempt to save the leg.

6. The season of the year.

7. Atmospheric peculiarities.

*Circumstances supposed to warrant amputation.*

1. When the injury done to the soft parts and bones is such as to warrant the impression that gangrene will inevitably ensue.

2. Where, along with the fracture, a portion of the limb is torn off, as we see in wounds inflicted by machinery, cannon shot, &c.

3. Where the soft parts are extensively stripped off.

4. Where the fracture extends into a large joint.

5. Where the bone is broken in several places, and the soft parts extensively injured.

6. Where the fracture is complicated with laceration of large bloodvessels and nerves.

Before resorting to amputation, even under these circumstances, weigh well its dangers.

*Time at which amputation should be performed.*—Difference of opinion among surgeons on this point: some preferring *immediate*, others *secondary* amputation. It would appear from the reports that in *civil* practice the latter method has been most successful, while in *military*, the former is most to be relied on. Many cases, however, admit of no delay, even in civil practice, and the surgeon must let experience determine the course to be pursued. Never operate until reaction to a certain degree has taken place.

*Treatment where it is determined to attempt the cure of the injury without amputation.*

1. *When the injury of the soft parts is comparatively slight.* Here we must close the wound at once by straps, the bandage, lint soaked in blood, or lint covered with oil-silk; apply splints, or the proper dressings, and treat the case like one of simple fracture.

2. *When the injury of the soft parts is more extensive, and the bones pro-*

*trude and overlap, and cannot readily be produced.* Here divide the soft parts, pick away any loose pieces of bone, and, if necessary, saw off the ends of the bone. Then apply a *loose* bandage of strips, place the limb on a pillow in a fracture box, or upon a carved splint, and use irrigation with cold water if the weather is warm, or if the accident occur in winter we may use the warm water dressing or a poultice. It is in this form, also, that the *bran* dressing of Dr. J. R. Barton is so useful. *Constitutional* symptoms are to be prescribed for.

3. When, in spite of all our efforts to prevent it, *profuse suppuration* takes place, we must give free vent to the pus, and support the constitution.

4. After the subsidence of *swelling, suppuration* and *severe pain*, treat the case like a simple fracture, with splints and bandages.

5. Where our remedies fail to relieve, and *mortification* sets in, we must amputate if possible.

*Character of the callus in compound fracture and the agents employed in its formation.*

### COMPLICATED FRACTURE.

#### *Definition.*

*Causes.*—The fragments may be thrust through large vessels, or nerves, or into joints; or the force producing the fracture may cause their injury, or occasion luxation.

*Dangers.*—1. Immediate shock to the system from loss of blood, or injury of the nerves. 2. Sloughing from infiltration of blood and serum. 3. Mortification from loss of nervous influence. 4. Permanent paralysis of the limb. 5. Phlebitis. 6. Hectic fever. 7. Tetanus.

*Question of amputation.*—No general rules can be laid down, but the circumstances already stated as modifying our treatment of compound fracture, should always be taken into consideration here.

*Treatment.*—Varies with the complication.

1. Where we have profuse hemorrhage from a wounded vein. Bleed, apply cold, and pressure, and afterwards frictions and pressure, to cause the absorption of the blood; occasionally a ligature will be required. Be careful to prevent phlebitis.

2. When we have hemorrhage from a large artery, characterized, where there is no external wound, by a tumour pulsating at first, apply a ligature above the tumour, and do not as a general rule open the integuments and seek for the artery as advised by Boyer. When the collection of blood is so great as to threaten sloughing, then open the tumour, evacuate the blood and tie the vessels. When a wound in the integument exists, we may sometimes dilate it, and thus tie the artery above and below.

3. When a large nerve is torn across, which is manifested by paralysis, numbness, pain and spasm of the limb, we must bleed, place the part at rest, apply leeches, cold or hot applications, and give anodynes.

4. In comminuted fracture, complicated with a wound in the integuments. We must take away splinters, *provided* they are not attached to the soft parts. Close the wound, and treat it like a bad compound fracture. When the bone is crushed to pieces, it will generally be proper to amputate.

5. When a luxation complicates the fracture, always protect the fracture by some firm dressings, then reduce the luxation as speedily as possible, and afterwards set the fracture and treat it according to the rules laid down.



6. When the fracture extends into a joint, we have to fear intense inflammation, and must treat the case accordingly.
7. When mortification takes place amputate.
8. When tetanus supervenes treat it in the usual manner.

#### IRREGULAR CALLUS, OR FRACTURE UNITING WITH DEFORMITY.

*Causes.*—Usually, neglect or bad treatment of the case, or the wilfulness of the patient, are the immediate causes of deformity.

*Question of the propriety of interference in these cases.*—Many points must be considered before the operation is undertaken.

1. The duration of the injury.
2. The degree of functional injury resulting from the deformity.
3. The practicability of relieving the deformity without endangering the life of the patient.
4. The size and location of the injury.
5. The age of the patient.
6. The health of the patient.
7. The season of the year.
8. The existence or not of disease of the soft parts or of the bone itself.

*Means employed to remove the deformity.*—These vary with the duration of the injury.

1. *Pressure and extension of the limb.*—When called to a badly set fracture, within the first sixty days after its occurrence, or while the callus is yet yielding, we may often succeed in restoring the limb by well regulated *pressure and extension of the limb*. Cases are reported by Dupuytren and others, in which these measures have succeeded even after the lapse of the 120th day from the receipt of injury.

2. *The seton.*—In these cases Wienhold proposes the introduction of a *seton*, which by causing suppuration would break down the callus.

3. *Rupture of the callus.*—If more than sixty or seventy days have elapsed before we are called, as a *general rule rupture of the callus* will prove more useful than any attempts to mould it into proper shape. This is an old operation, and has been recently revived by Æsterlen, Richerand, Dupuytren and others.

*Cases to which it is applicable.*

*Dangers of this operation.*

*Preparation of the patient.*

*Mode of rupturing the callus.*

*After treatment.*

4. *Resection of bone.*—In cases of long standing, where the bones overlap, and are firmly bound to each other, *pressure*, the *seton*, and *refracture* will all fail to afford relief, and we must then resort to “*resection of the bones.*”

*Dangers of this operation.*

*Preparation of the patient.*

*Mode of performing the operation.*

*After treatment.*

5. *Removal of exuberant callus.*—When the spicula or ledges of bone are thrown out around the seat of fracture, and interfere with the motion of the parts, or occasion pain, we may, after waiting a few months, for the efforts of nature cut down upon them and remove them with the knife or saw. (See cases of this deformity reported by Alcock, Velpeau, Dawson and myself.)

## PSEUDARTHROSIS, FALSE JOINT, OR NON-UNION.

*Definition.**Frequency of the defect.*

*Varieties.*—1. Where the fragments are united by *soft callus*. 2. Where the fragments are united by a *ligamentous band* or *bands*. 3. Where the fragments are united by *cellular tissue* alone. 4. Where a *sort of joint* is established. The bones being rounded off, tipped with cartilage, covered by a synovial membrane, and held together by a capsular ligament. Very rare.

*Causes.*—1. Constitutional. 2. Local.

*First or constitutional.*

- a. Syphilis.
- b. Pregnancy and suckling.
- c. Fevers of different kinds.
- d. Cancer.
- e. Fragilitas ossium.
- f. Scurvy.
- g. General impoverishment of the system.
- h. Paralysis.
- i. Deficient supply of arterial blood.
- j. Advanced age.

*Second or local.*

- a. Frequent motion of the fragments.
- b. Separation of the fragments.
- c. Disease of the fragments.
- d. Interposition of foreign bodies between the fragments.
- e. Tight bandaging.
- f. The long continued use of cooling applications.
- g. The too early use of a fractured limb.
- h. Division or stripping off the periosteum.
- i. Want of cellular tissue.

*Symptoms.**Diagnosis.**Prognosis.**Object of treatment.*‡

*Treatment.*—Various methods have been introduced.

1. Simply keeping the parts in splints for several months.
2. Friction.
3. Compression.
4. The application of caustic alkali to the integuments over the seat of fracture.
5. The introduction of a heated canula between the bones. Proposed by Mayor.
6. The seton—proposed by Dr. Physick. Modification of this agent by Rhynd.
7. Escharotics applied to the ends of the bone.
8. Removal of the extremities of the fragments.
9. Section of ligamentous union.
10. Section of muscles attached to the fragments, coaptation, and friction or pressure. Proposed by Dieffenbach, in false joint of the olecranon, patella, &c.
11. Acupuncture.
12. Electricity.



13. Blisters.
14. The use of iodine or mercury.
15. The metallic ligature of Somme.
16. The actual cautery. Employed by Kirkbride and others.

#### DIASTASIS, OR SEPARATION OF EPIPHYSES.

##### *Definition.*

*Age at which the accident occurs.*—Varies in different individuals. May take place at any age previous to that at which the epiphyses become attached by bone. This generally occurs before puberty.

*Causes.*—Violence or muscular contraction

*Synonymes.*—Obscure. Unnatural mobility at the seat of the epiphysis is the most important sign.

*Diagnosis.*—May be confounded with *fracture or luxation.*

*Prognosis.*—The injury, if properly managed, rarely results in deformity; if neglected, the person is almost sure to be crippled.

*Treatment.*—Depends of course on the seat of the lesion. The general indications are nearly the same with those laid down for our guidance in the treatment of fracture.

### PARTICULAR FRACTURES.

#### I. NASAL BONES.

##### *Liability.*

##### *Causes.*

##### *Varieties.*

*Complications.*—Concussion of brain; emphysema; injury of lachrymal duct and canal; fracture of cribriform plate; inflammation, and caries or necrosis of the bones.

##### *Symptoms.*

##### *Diagnosis.*

##### *Prognosis.*

##### *Treatment.*

#### II. MALAR BONES.

*Liability.*—This accident is very rare.

##### *Causes.*

##### *Varieties.*

##### *Complications.*

##### *Symptoms.*

##### *Diagnosis.*

##### *Prognosis.*

##### *Treatment.*

#### III. SUPERIOR MAXILLARY BONES.

##### *Liability.*

##### *Causes.*

##### *Varieties.*

##### *Complications.*

##### *Diagnosis.*

##### *Prognosis.*

##### *Symptoms.*

##### *Treatment.*

## IV. INFERIOR MAXILLARY.

*Liability.**Causes.**Parts most liable to fracture.**Varieties.**Complications.**Symptoms of each of the fractures of this bone.**Diagnosis.**Prognosis.**Treatment.*—Depends on the seat of fracture.

## V. OS HYOIDES.

*Liability.**Causes.**Varieties.**Complications.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## VI. THYROID CARTILAGE.

*Liability.**Causes.**Varieties.**Complications.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## VII. STERNUM.

*Liability.**Causes.**Varieties.**Complications.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## VIII. RIBS.

*Liability.**Ribs most frequently broken.**Parts of the bone most liable to fracture.**Causes.* External violence. Muscular contraction, as in coughing.*Varieties.**Complications.*—Hemoptysis, emphysema, pleuritis, empyema*Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## IX. CLAVICLE.

*Liability.*—Its *shape, size, texture, exposed situation, and function*, render this bone very liable to fracture.

*Parts usually broken.*

*Causes.*—Direct or indirect violence.

*Varieties.*—Complete, incomplete, simple, &c.

*Complications.*—Paralysis of arm, injury of axillary plexus and vessels. (Earle.)

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Treatment.*—Various dressings employed to carry out the *three indications* of Dessault. 1, Dessault's bandage; 2, Boyer's bandage; 3, Mayor's handkerchiefs; 4, Fox's apparatus; 5, Brown's bandage; 6, Dr. Reynell Coates' bandage; 7, Hiester's dressing; 8, Sir A. Cooper's.

## X. SCAPULA.

*Liability.*—Its *site and mobility* protect it in a great measure from fracture.

*Parts most liable to fracture.*—1, acromion process; 2, inferior angle; 3, body of the bone; 4, the coracoid process; 5, the spine; 6, the neck.

*Causes.*

*Varieties.*

*Complications.*

*Symptoms.*—Depend on part broken.

*Diagnosis.*—Depends on part broken.

*Prognosis.*—Depends on part broken.

*Treatment.*—Varies with the seat of injury.

## XI. HUMERUS.

*Liability.*—According to Longsdale, fractures of this bone are proportionately less frequent than is usually supposed—about one-sixteenth of all fractures.

*Ages at which it usually occurs.*—Childhood and old age.

*Parts of the bone liable to fracture.*—1, the head; 2, the anatomical neck; 3, the surgical neck; 4, the epiphysis; 5, the shaft; 6, the condyles.

*Causes.*—Muscular contraction, direct and indirect violence.

*Varieties.*

## HEAD OF HUMERUS.

*Liability.*

*Causes.*

*Variety.*

*Signs.*

*Diagnosis.*

*Prognosis.*

*Treatment.*

## ANATOMICAL NECK.

*Liability.*

*Causes.*

*Variety.*

*Signs.*

*Diagnosis.*

*Prognosis.*  
*Treatment.*

SURGICAL NECK.

*Liability.*  
*Causes.*  
*Variety.*  
*Signs.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

SEPARATION OF THE EPIPHYSIS.

*Liability.*  
*Causes.*  
*Variety.*  
*Signs.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

SHAFT ABOVE INSERTION OF DELTOID.

*Liability.*  
*Causes.*  
*Variety.*  
*Signs.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

SHAFT AT ITS MIDDLE.

*Liability.*  
*Causes.*  
*Variety.*  
*Signs.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

SHAFT ABOVE CONDYLES.

*Liability.*  
*Causes.*  
*Variety.*  
*Signs.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

CONDYLES.

*Liability.*  
*Causes.*  
*Variety.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XII. BONES OF THE FORE-ARM

*Liability.*—More frequently broken than the humerus—one-fifth of all fractures.

*Bones involved.*—One or both may be broken. The radius is most liable, from its connexion with the wrist.

*Causes.*

*Varieties.*

## BOTH BONES.

*Parts generally broken.*

*Causes.*

*Variety.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Treatment.*

## FRACTURE OF RADIUS ALONE.

*Liability.*—Very common.

*Causes.*

*Variety.*

*Parts usually broken.*—Head, neck, shaft, or inferior extremity.

*Symptoms of each.*

*Diagnosis.*

*Prognosis.*

*Treatment.*

## FRACTURE OF ULNA ALONE.

*Liability.*

*Causes.*

*Variety.*

*Parts usually broken.*—Shaft, extremities, coronoid process, olecranon process.

*Signs of each.*

*Diagnosis.*

*Prognosis.*

*Treatment.*

## XIII. CARPAL BONES.

*Liability.*

*Causes.*

*Varieties.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Treatment.*

## XIV. METACARPAL BONES

*Liability.*

*Causes.*

*Varieties.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Treatment.*

## XV. PHALANGEAL BONES.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XVI. SACRUM.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XVII. OS COCCYGIS.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XVIII. OS INNOMINATUM.

*Liability.*  
*Causes.*  
*Situation of fracture.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XIX. FEMUR.

*Importance of the fractures of this bone.*  
*Liability.*  
*Causes.*  
*Varieties.*  
*Parts usually broken.*—Head, neck, trochanters, shaft, and condyles.

## FRACTURE OF THE HEAD.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*



## FRACTURE OF THE CERVIX WITHIN THE CAPSULAR LIGAMENT.

*Liability.**Causes.**Age most liable.**Sex most liable.**Varieties.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*FRACTURE OF THE CERVIX WITHOUT THE CAPSULAR LIGAMENT, OR  
PARTLY WITHIN AND PARTLY WITHOUT.*Liability.**Causes.**Age most liable.**Varieties.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## FRACTURE OF THE TROCHANTERS.

*Liability.**Causes.**Varieties.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## FRACTURE OF THE SHAFT JUST BELOW TROCHANTERS.

*Liability.**Causes.**Varieties.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## FRACTURE OF THE SHAFT.

*Liability.**Causes.**Varieties.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## FRACTURE OF THE CONDYLES.

*Liability.**Causes.**Varieties.**Symptoms.*

*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XX. PATELLA.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XXI. BONES OF THE LEG.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## FRACTURE OF FIBULA ALONE.

*Liability.*  
*Causes.*  
*Varieties.*  
*Part of bone usually broken.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## FRACTURE OF THE TIBIA ALONE.

*Liability.*  
*Causes.*  
*Varieties.*  
*Part of bone usually broken.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## XXII. BONES OF THE FOOT.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## FRACTURE OF OS CALCIS.

*Liability.*  
*Causes.*  
*Varieties.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

## 2. DISEASES AND INJURIES OF THE JOINTS.

### GENERAL REMARKS.

JOINTS MOST LIABLE TO DISEASE.

CAUSES OF DISEASE.

EFFECTS ON CONSTITUTION.

CLASSIFICATION.—All the diseases of the joints may be ranged under nine heads.

1. Diseases originating in the soft parts, either *intra* or *extra*-articular.
2. Diseases originating in the hard tissues of a joint.
3. Affections which may be considered as products or terminations of diseased action.
4. Malignant diseases of the joints.
5. Wounds.
6. Sprains.
7. Dislocations.
8. Congenital luxation.
9. Diseases of the bursæ mucosæ.

### FIRST HEAD.

- a.* Synovitis—acute and chronic.
- b.* Hydrops articuli.
- c.* Abscess.
- d.* Elongation of ligaments.
- e.* Inflammation of ligaments.
- f.* Fleshy tumours of the synovial membranes.
- g.* Loose cartilages in the joints.
- h.* Certain forms of white swelling.
- i.* Coxalgia, or hip disease.
- j.* Neuralgia.
- k.* Inflammation of the cellular tissue.

### SECOND HEAD.

- a.* Certain forms of white swelling.
- b.* Certain forms of coxalgia.

### THIRD HEAD.

- a.* Hypertrophy of articular cartilage.
- b.* Atrophy of articular cartilage.
- c.* Eburnation of articular cartilage.
- d.* Softening of articular cartilage.
- e.* Ulceration of articular cartilage.
- f.* Reparation of articular cartilage after wounds, &c.
- g.* Alteration in the form of the head and neck of the long bones.
- h.* Collections of blood in a joint.
- i.* Chalkey concretions in a joint.
- j.* Anchylosis.

*First Head.*

## I. SYNOVITIS.

*Definition.*

*Causes.*—1. Constitutional. 2. Local.

*First, or constitutional.*—Rheumatism, gout, gonorrhœa, parturition, pregnancy, checked leucorrhœa, catheterism.

*Second, or local.*—Blows, strains, mechanical injuries of all kinds, foreign bodies in the joints, wounds.

*Symptoms.*—Pain on the slightest motion; swelling, redness, heat, and tenderness of the skin; fluctuation; displacement of any loose bone or cartilage about the joint; and constitutional disturbance.

*Diagnosis.*—May be confounded with inflamed bursæ, but scarcely with any thing else.

*Prognosis.*—Varies. When but one joint is affected—when the cause is local—when the inflammation runs high—it may terminate in ulceration or degeneration of the synovial membranes, ulceration of the cartilages and bones, necrosis, the loss of the joint, or even the life of the patient. Under other circumstances the prognosis is rather favorable.

*Dissection.*

*Treatment.*—General indications. 1. Remove the cause. 2. Subdue the inflammation by general and local antiphlogistic remedies. 3. Employ specific remedies when the cause is specific. 4. prevent ankylosis.

## II. HYDROPS ARTICULI, OR HYDRARTHUS.

*Definition.**Causes.**Symptoms.**Diagnosis.**Prognosis.**Dissection.**Treatment.*

## III. ABSCESS.

*Causes.**Symptoms.**Diagnosis.**Prognosis.**Dissection.**Treatment.*

## IV. ELONGATION OF LIGAMENTS.

*Causes.**Symptoms.**Diagnosis.**Prognosis.**Dissection.**Treatment.*

## V. INFLAMMATION OF LIGAMENTS.

*Causes.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## VI. FLESHY TUMOURS OF THE SYNOVIAL MEMBRANE.

*Causes.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*

## VII. CARTILAGES IN THE JOINTS.

*Definition and history.**Joints most liable.*—The ginglymoidal, especially the knee, elbow and jaw.*Condition in the joint.*—Loose or attached.*Size.*—Varies.*Consistence.*—Varies.*Structure.*—Scarcely organized.*Number.*—Varies.*Mode of formation.*—Different explanations. Those of Paré, Monro, Erlangen, Hunter, Cooper, and Brodie, referred to.*Symptoms.**Diagnosis.**Prognosis.**Treatment.*—Two general methods. 1. Compression. 2. Extraction. Relative value of the two. Dangers of extraction referred to, and the different operations, especially that of Goyraud and Syme, explained.

## VIII. WHITE SWELLING, OR FUNGUS ARTICULI.

*Definition.**Confusion in relation to the precise meaning of the term.**Brodie's Classification.*—According to Sir Benj. Brodie, all the causes of white swelling may be referred to one of four different lesions. 1. Simple inflammation of the synovial membrane. 2. Gelatinous degeneration of the synovial membrane. 3. Ulceration of the cartilages. 4. Ulceration of the bones.*Ages most liable.**Joints most liable.**Causes.*—Constitutional and local.*Symptoms.*—Vary with the form of lesion. Three groups may be made.*Diagnosis.*—Highly important to distinguish one from the other.*Prognosis.*—Varies, but generally it is unfavourable.*Terminations.*—Resolution, ankylosis, suppuration, alteration of all the tissues of the joint, necrosis, the loss of the joint or limb, or the life of the patient.*Dissection.*—Depends on the stage at which it is made, and the form of the disease.*Treatment.*—Differs somewhat in each variety, but there are certain general indications that will answer for all. The remedies are of course both constitutional and local.*General indications in the first stage of the disease.*—1. Keep the part at rest by splints and position. 2. Employ general and local antiphlogistics if inflammation runs high. Prevent contraction of the limb.*General indications in the second stage.*—1. Counter irritation should be employed. 2. Pressure as recommended by Scott is often useful. 3. Employ alteratives to suit the diathesis. 4. Keep the joint at rest, while the patient

is allowed, if possible, access to the fresh air. Crutches and sling, &c. 5. Support the strength if prostration should supervene. 6. Prevent ankylosis.

*General indications in the third stage.*—1. Support the general health. 2. Never open the abscess unless we are forced to do so by peculiar circumstances. 3. Poultice the part after the abscess opens. 4. Keep the joint in a splint. 5. It is often essential to obtain ankylosis, to save the life of the patient. 6. When all our remedies fail, and the patient is sinking, *amputate* or *excise* the joint.

## IX. COXALGIA OR HIP DISEASE.

### *Definition.*

*Persons most liable.*—Children of a scrofulous habit, from three to four years of age, or from seven to fourteen. May occur in adults.

*Causes.*—1. Constitutional. 2. Local.

*First, or constitutional.*—Scrofula, atmospheric changes, rheumatism, repelled eruptions.

*Second, or local.*—Mechanical injuries of every kind.

*Symptoms.*—May be divided into four groups. 1. Those which characterize the period of apparent *elongation* of the limb, with slight pain in the knee and lameness, &c. &c. 2. Those which belong to the period of *shortening* of the limb, with pain in the hip itself, &c. &c. 3. Those which characterize the period of suppurating and ulceration in the joint. 4. Those which indicate convalescence. The causes of *elongation* and *shortening* in the first and second stages explained.

*Diagnosis.*—May be confounded with—

a. Fracture of the cervix femoris.

b. Luxation of the caput femoris.

c. Congenital luxation.

d. Rheumatism.

e. Chronic inflammation of the upper third of the femur.

f. Sciatica.

g. Psoas abscess.

*Prognosis.*—May be stated to be generally unfavourable.

*Dissection.*—The appearances on dissection depend upon the stage and progress of the disease.

*Pathology.*—Much diversity of opinion on this point. State my own views.

*Treatment.*—General indications. 1. Rest and the antiphlogistic system throughout the first stage. 2. Place the limb in a splint of such construction as shall maintain the limb as nearly in its natural position as possible, so that when resolution cannot be obtained, and false joint or ankylosis must be brought about, the patient may still retain its use. Speak of Physick and Humbert's method of practice. 3. Attend to the Diathesis. 4. Apply counter irritants. 5. Support the health when this support is indicated. 6. Evacuate pus when it is formed in large quantities, poultice, and support the health. 7. When resolution cannot be obtained, endeavour to form a false joint, or establish ankylosis. 8. After inflammation has subsided, and the limb remains shortened from muscular contraction, it is often useful to employ Humbert's method of reduction. Point out the dangers of this practice, as well as its advantages. 9. Protect the limb for some time after the cure has been established. 10. When the limb is shortened or deformed, apply some apparatus by which the patient will be enabled to walk with comfort.



## X. NEURALGIA.

*Definition.**Persons usually attacked.**Causes.**Symptoms.**Diagnosis.**Prognosis.**Treatment.*XI. INFLAMMATION OF THE CELLULAR TISSUE EXTERIOR  
TO THE JOINT.*Causes.**Symptoms.**Diagnosis.**Prognosis.**Treatment.**Second Head.*

## I. CERTAIN FORMS OF WHITE SWELLING.

For the characteristics of these forms, refer to what has already been given under the first head.

## II. CERTAIN FORMS OF COXALGIA.

For the characteristics of these forms, refer to what has already been said under the first division.

*Third Head.*

## I. HYPERTROPHY OF THE ARTICULAR CARTILAGES.

*Causes.**Symptoms.**Diagnosis.**Prognosis.**Dissection.**Treatment.*

## II. ATROPHY OF THE ARTICULAR CARTILAGES.

*Causes.**Symptoms.**Diagnosis.**Prognosis.**Dissection.**Treatment.*

## III. EBURNATION OF THE ARTICULAR CARTILAGES.

*Causes.**Symptoms.**Diagnosis.**Prognosis.**Dissection.**Treatment.*

## IV. SOFTENING OF THE ARTICULAR CARTILAGES.

*Causes.**Symptoms.**Diagnosis.*

*Prognosis.*  
*Dissection.*  
*Treatment.*

#### V. ULCERATION OF THE ARTICULAR CARTILAGES.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

#### VI. REPARATION OF THE ARTICULAR CARTILAGE AFTER WOUNDS AND FRACTURES.

Describe this process.

#### VII. ALTERATION IN THE FORM OF THE HEAD AND NECK OF THE LONG BONES.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

#### VIII. COLLECTIONS OF BLOOD IN THE CAVITY OF A JOINT.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

#### IX. CHALKEY CONCRETIONS IN AND AROUND JOINTS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

#### X. ANCHYLOSIS.

*Definition.*

*Classification.*—1. Partial or local.  
 2. General or universal.  
 1. True or complete.  
 2. False or incomplete.  
 1. Extra capsular.  
 2. Intra capsular.  
 3. Capsular.

*Causes.*—Most of the causes operate by keeping the parts motionless, or nearly so, for a length of time. For example: diseases of various kinds, tumours, fractures, dislocations, simple rest, cicatrices, injuries of tendons and muscles, paralysis of one set of muscles, contraction of fascia, &c.; others operate under all circumstances, as old age, chronic rheumatism or gout. Sometimes it is a protective effort of nature, as seen in curvatures of the spine, ankylosis of diseased joints, &c.

*Liability.*—Ginglymoid joints are more frequently thus affected than the orbicular. Why?

*Symptoms.*—Depend on the variety of ankylosis.

*Diagnosis.*—Cannot be confounded with any other affection. There is often much difficulty, however, in distinguishing one form from another.

*Prognosis.*—Varies with the character of the lesion—the nature of its cause—the duration of the case—the age and health of the patient—the joint involved, &c.

*Dissection.*—Varies with the kind of ankylosis.

*Treatment.*—In *true* ankylosis we can only relieve the patient by *establishing a false joint*, or straightening the limb by *cutting out a plug of bone*, as performed by Dr. J. R. Barton. Never *excise the joint*, nor *amputate the limb*, as advised by some; nor should we attempt Louvrier's operation.

In *false* ankylosis, the treatment is modified by the cause of stiffness.

The agents usually employed are *passive motion, frictions, electricity, galvanism, vapour bath, the screw, division of tendons, fascia and muscles, excision of cicatrices*, and *some contrivance to take the place of paralysed muscles*, as advised by Sir C. Bell. The comparative merit and dangers of these means explained.

#### *Fourth Head.*

### MALIGNANT DISEASES.

The joints are liable to be attacked with malignant diseases of various kinds, but especially with *malignant exostosis, medullary sarcoma*, and *fungus hematodes*. For the characteristics of these diseases, as well as their treatment, see chapter on "Tumours."

#### *Fifth Head.*

### WOUNDS OF JOINTS.

*Division.*

*Causes.*

*Symptoms.*—Vary with the character of the wound.

*Diagnosis.*—Generally, there is no difficulty in deciding upon the character of the wound at once. Punctured wounds may be confounded with wounds of the bursæ mucosæ.

*Prognosis.*—Depends on the *joint injured, the character of the wound, the age and health of the patient, the season of the year, and the possibility of obtaining the proper remedies*.

*Dangers.*—Inflammation, tetanus, caries, and necrosis.

*Dissection.*—The appearances on dissection depend upon the stage of the disease at which the examination is made.

*Treatment.*—Divided into—1. Constitutional. 2. Local. The remedies must be modified to suit the peculiarities of the case.

#### *Sixth Head.*

### SPRAINS.

*Definition.*

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Results or effects of the injury.*

*Treatment.*

## *Seventh Head.*

### DISLOCATIONS.

*Definition.*

*Causes.*—1. Predisposing or remote. 2. Proximate or efficient. The first class may be subdivided into the *local* and *general*.

(1.) The local predisposing causes are—

- a. Preternatural length of the ligaments of a joint, (see Stanley.)
- b. Peculiar congenital conformation of the joint.
- c. The form of the joint.
- d. Paralysis of the muscles around the joint.
- e. Diseases of the constituent tissues of a joint.
- f. Hydrops articuli.
- g. Tumours or earthy deposits in or about the joints.
- h. Interstitial change in the articulating surfaces.

The general predisposing causes are—

- a. Preternatural laxity of the entire ligamentous system, (see Delpech.)
- b. The age. Dislocations are rare in the *very young* or *very old*.

(2.) *Local or external causes.*

- a. External violence.
- b. Muscular action.

*Joints most liable to luxation.*—The ball and socket joints, from the character of their articulating surfaces; the weakness of their ligaments; and their subjection to the influence of a larger number of muscles, are more frequently dislocated than the ginglymoid.

*Classification of dislocations.*—The first division is based upon the definite position of the head of the bone. Thus we have—

- a. Primitive luxation.
- b. Consecutive luxation.

The second division is based upon the degree of displacement. Thus we have—

- a. Complete luxation.
- b. Incomplete luxation, or sub-luxation.

The third division is based upon the duration of the accident. Thus we have—

- a. Recent luxation.
- b. Old luxation.

The fourth division is based upon the degree of injury inflicted upon the adjacent soft parts or the bones themselves. Thus we have—

- a. Simple luxation.
- b. Compound luxation.
- c. Complicated luxation.

*Symptoms of luxation.* 1. Rational or Physiological. 2. Sensible or physical.

First, or rational.

- a. Pain.
- b. Numbness, or paralysis in limb.
- c. Loss of motion.
- d. Constitutional disturbance.

Second, or physical.

- a. Change in the form of the entire limb.
- b. Change in the natural length of the limb.
- c. Unnatural rigidity of the limb.
- d. The disappearance or preternatural enlargement of the natural prominences of the joint.
- e. The appearance of unnatural cavities about the joint.
- f. The appearance of a tumour (formed by the head of the bone) in the vicinity of the joint.

*Diagnosis.* Dislocations may be confounded with—

- 1st. Fractures.
- 2d. Sprains.
- 3d. Bent bones.

*Prognosis.*—Depends on a variety of circumstances. It is modified, for example, by

- a. The joint involved.
- b. The degree of displacement.
- c. The duration of the injury.
- d. The degree of injury sustained by the soft parts or bone.
- e. The constitution of the patient.
- f. The direction taken by the head of the bone.

*Dissection.*—Appearances depend on the duration of the injury, and the tissues upon which the head of the bone rests.—State the usual appearance in *recent and old luxations*.

*Treatment.*—General indications.

1. The general condition of the patient demands our first attention, and before we attempt to relieve the injury he must be placed in as comfortable a position as possible, his fears calmed, and reaction to a certain degree established. It is sometimes well to deviate from the last direction, for should the patient faint from pain merely, his muscles are in the most favorable condition for our attempts at reduction.

2. As there is always displacement, "*reduction*" will be required. This may be accomplished, in many cases, by the employment of *mechanical means* alone, but often *constitutional agents* are required.

The mechanical means are—

- a. Extension.
- b. Counter extension.
- c. Change in the position of the different bones.—To accomplish these objects we employ *the hands of assistants, bands, rollers, the pullies, and various apparatus* for overcoming muscular resistance.—The forces must be applied *steadily and slowly, they must also be equal, and generally in the line of displacement*.—Muscular resistance is often overcome by directing the patient's mind from the set of muscles concerned in the accident.—We must also select the *part* upon which our *extending and counter extending bands* are to be placed.—Difference among surgeons on this point.—The obstacles to reduction by mechanical means alone are—

1. Muscular contraction.
2. The degree of laceration of the soft parts.
3. The shape of the joint.
4. The locking of the bones.
5. The existence of adhesions.

6. The interposition of tendons or ligaments.

The constitutional remedies employed, are intended chiefly to produce prostration, so that all muscular resistance is destroyed: and the most efficient are—

- a. Bloodletting.
- b. Hot bath.
- c. Tart. Antim. et Potassæ.
- d. Fumes of tobacco, or injections of its infusion.
- f. Intoxication.

Value of Myodiatomy in difficult cases discussed.—Also the propriety of attempting the reduction of *old luxations* considered.

3. From the partial paralysis of the muscles, and laceration of the ligaments, it is essential to apply some mechanical means to prevent the recurrence of the luxation.—The usual dressings for fractures of the same bones may be employed, for a week or two after the reduction of the accident.

4. As inflammatory symptoms may supervene, measures must be taken to prevent their occurrence, and should they occur in spite of our efforts to the contrary, the antiphlogistic system in all its details must be employed.

5. For the rigidity, which in almost every case, is the result of the dislocation, the remedies already mentioned as applicable to the same difficulty coming on after fractures, may be had recourse to.

6. When complicated with fracture, always recollect to dress both injuries before you leave the patient, and also to adopt the plan of treatment already indicated under the head of fractures.

## COMPOUND AND COMPLICATED LUXATIONS.

After the reduction of the bones, the treatment in these injuries is identical with that advised in cases of compound and complicated fractures.—It is, therefore, needless to repeat it here.—The remarks relative to the dangers, and question of amputation, in the latter class of accidents, apply very well to the former,

## PARTICULAR LUXATIONS.

### I. INFERIOR MAXILLARY.

*Anatomy of the joint.*

*Liability.*—This accident is common.

*Causes.*—1. Predisposing.—2. Proximate.

(1.) Age, sex, and preternatural elongation of the processus vaginalis.

(2.) Muscular contraction, and force directly applied.

*Variety.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

### II. SUB-LUXATION OF THE LOWER JAW.

*Definition.*

*Causes.*



*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

### III. OS HYOIDES.

*Liability.*  
*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

### IV. RIBS.

*Anatomy of the articulations.*  
*Liability.*  
*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

### V. STERNUM.

*Liability.*  
*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

### VI. CLAVICLE.

*Anatomy of its articulations.*  
*Liability.*—May be luxated at either extremity. The scapular is most frequently displaced.  
*Direction of Displacement.*—The sternal extremity may be displaced in three directions:—*forwards, backwards, and upwards.* The scapular is usually thrown *upwards* or *downwards* beneath the acromion process.

#### I. STERNAL EXTREMITY FORWARDS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

#### II. STERNAL EXTREMITY BACKWARDS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## III. STERNAL EXTREMITY UPWARDS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## IV. SCAPULAR EXTREMITY UPWARDS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## V. SCAPULAR EXTREMITY DOWNWARDS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## VII. LUXATION OF THE INFERIOR ANGLE OF THE SCAPULA.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## VIII. LUXATION OF THE HEAD OF THE HUMERUS.

*Anatomy of the articulation.*

*Liability.*—Very great, from the small size of the articulating surfaces; the weakness of its ligaments; the freedom of its motions; its constant exposure; and from its subjection to the influence of several muscles.

*Direction of Displacement.*—Downwards, forwards, backwards, and partially upwards and forwards. Displacement directly upwards, to any extent, cannot occur without fracture of the acromion. Explain the *intercostal* and *thoracic* luxations mentioned by Larrey and Percy.

## I. DOWNWARD LUXATION.

*Causes.*  
*Symptoms.*

*Diagnosis.*—May be confounded with fracture of *cervix scapulæ*, fracture of the neck of the humerus, bruises, paralysis of the muscles, and dislocation of the biceps tendon.

*Prognosis.*  
*Dissection.*

*Complications.*—Great swelling; emphysema; inflammation; paralysis of muscles.

*Treatment.*—General indications.

- a. Fix the scapula.
- b. Relax the muscles.
- c. Draw the head of the bone to its cavity.

General methods.

- a. Simple elevation of the arm.
- b. Lifting the head of the bone while the arm is abducted.
- c. Mothe's plan, or rather Mr. White's.
- d. Extension, with heel in the axilla.
- e. Pullies and bands.
- f. Reducing apparatus of different kinds.
- g. Myodiatomy.

It may be necessary to use *constitutional* remedies in combination with either of these plans.

## II. FORWARD LUXATION.

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Complications.*

*Treatment.*—Reduce to the first, and then employ the measures already indicated.

## III. BACKWARD LUXATION.

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Complications.*

*Treatment.*—Reduce to the first, and then employ the measures already pointed out as efficient in the reduction of the former.

## IV. PARTIAL, OR SUBLUXATION.

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## V. DISLOCATION OF THE BICEPS TENDON.

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## IX. LUXATION AT THE ELBOW-JOINT.

*Anatomy of the joint*

*Liability.*

*Direction of displacement.*—Backwards and upwards of both bones; later-

al of both bones ; forwards of both bones ; forwards of the head of the radius ; backwards of the head of the radius ; imperfect luxation of the head of the radius ; upwards of the superior extremity of the ulna.

#### I. BACKWARDS AND UPWARDS OF BOTH BONES.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

#### II. LATERAL DISPLACEMENT.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

#### III. FORWARD DISPLACEMENT.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

#### IV. FORWARDS OF THE HEAD OF THE RADIUS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

#### V. BACKWARDS OF THE HEAD OF THE RADIUS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

#### VI. IMPERFECT LUXATION OF THE HEAD OF THE RADIUS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

#### VII. LUXATION OF THE SUPERIOR EXTREMITY OF THE ULNA.

*Causes.*

## IV. SUBLUXATION FROM LENGTH OF LIGAMENTS.

*Causes.*—*Congenital or acquired.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## V. LUXATION OF THE HEAD OF THE FIBULA.

*Varieties.*

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## XVII. LUXATION OF KNEE.

*Importance.*

*Anatomy of the joint.*

*Liability.*

*Direction of displacement.*—Inwards; Outwards; Forwards; Backwards.

## I. INWARDS.

*Causes.*

*Complications.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## II. OUTWARDS.

*Causes.*

*Complications.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## III. FORWARDS.

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## IV. BACKWARDS.

*Causes.*

*Symptoms.*

*Diagnosis.*

*Prognosis.*

*Dissection.*

*Treatment.*

## XX. LUXATION OF THE TARSAL BONES.

## I. ASTRAGALUS.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## II. THE CUNEIFORM, ETC.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## XXI. LUXATION OF THE METATARSAL BONES.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

## XXII. LUXATION OF THE PHALANGES.

*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Dissection.*  
*Treatment.*

*Eighth Head.*

## CONGENITAL LUXATION.

*Definition.*  
*Varieties.*  
*Causes.*  
*Symptoms.*  
*Diagnosis.*  
*Prognosis.*  
*Treatment.*

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ERRATUM.—Under the classification of Diseases of the Joints, diseases of the Bursæ have been introduced by mistake at the ninth head.





